Small Business Innovation Research/Small Business Tech Transfer

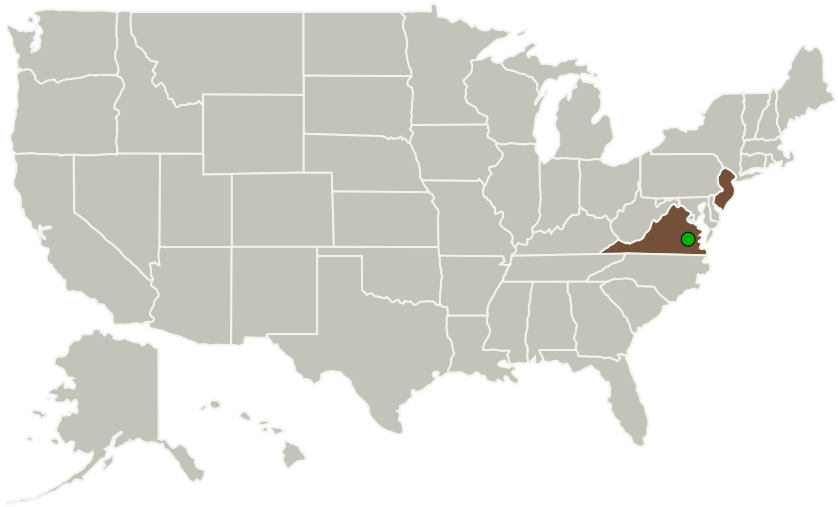
Variable-Fidelity Aeroservoelastic Analysis Tool for Concept Evaluation, Design and Wind-Tunnel Test Support, Phase I

Completed Technology Project (2014 - 2014)

Project Introduction

Ongoing work in advanced air-vehicles, such as ultra-light-weight truss-braced and elastically tailored concepts is beginning to provide the insight necessary to meet NASA's N+3 transport system goals. Unfortunately, contemporary analysis methods are unsuited for aeroservoelastic analysis of such configurations suffering from accessibility, usability, fidelity or resource constraints. Design tools have typically been developed using configuration dependent low-fidelity approaches that are unsuitable to reliably analyze advanced configurations. Contemporary aeromechanics solvers (i.e. viscous compressible Computational Fluid Dynamics coupled to Finite Element structural models) can analyze advanced concepts, but require significant user input to support advanced configurations, not to mention extensive computational resources. What has long been needed is an approach that bridges the middle ground to enable aeroservoelastic analysis at the "appropriate level of fidelity for the problem at hand", while reliably permitting the novel application of aeroelastic knowledge to new concepts, in addition to supporting wind-tunnel and flight tests by enabling the efficient investigation of flight dynamics, flutter, stability and control. By exploiting Continuum Dynamics Inc.'s extensive experience developing fully-coupled aeromechanics methods, we propose the development of a new rapid, reliable, variable–fidelity first-principles physics-based aeroservoelastic analysis to support concept evaluation, wind-tunnel/flight testing and design.

Primary U.S. Work Locations and Key Partners



Variable-Fidelity Aeroservoelastic Analysis Tool for Concept Evaluation, Design and Wind-Tunnel Test Support Project Image

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Organizations Performing Work	Role	Type	Location
Continuum Dynamics, Inc.	Lead Organization	Industry	Ewing, New Jersey
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New Jersey	Virginia

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137590)*

Images

Project Image
Variable-Fidelity Aeroservoelastic Analysis Tool for Concept Evaluation, Design and Wind-Tunnel Test Support Project Image *(https://techport.nasa.gov/image/127328)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Continuum Dynamics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

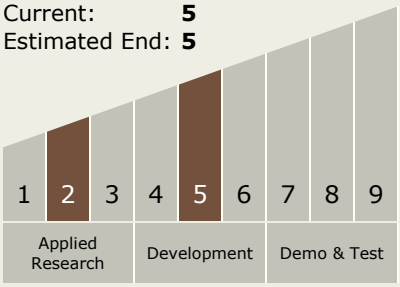
Carlos Torrez

Principal Investigator:

Glen Whitehouse

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.3 High Performance Processors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System